

AIR POWER; A SOLUTION FOR BOSNIA

**A Monograph
by
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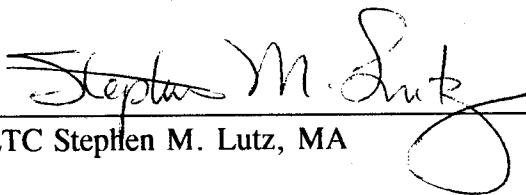
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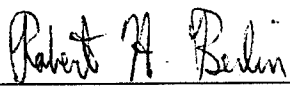
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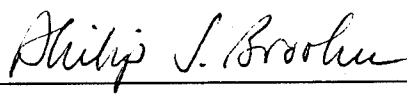
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ABSTRACT

AIR POWER: A SOLUTION FOR BOSNIA by Maj Kurtis D. Lohide, USAF, 54 pages

Americans find the Bosnian Serb practice of "ethnic cleansing" morally unconscionable. As United Nations peacekeeping efforts have proved unable to halt the ethnic violence, the U.S. public has increasingly looked to its military for a solution. However, the American public imposes strict criteria on using U.S. armed forces for such a mission. Since no U.S. national interests are involved, Americans demand friendly casualties be kept to an absolute minimum. Additionally, since the mission has a humanitarian orientation, enemy and non-combatant casualties must also remain low. Military traditionalists spurn this concept of "humanitarian force" calling the idea fundamentally flawed. They warn that since the Bosnian Serb Army (BSA) is an unconventional force, Bosnia represents another Vietnam in waiting. This study refutes their argument. It asserts that the U.S. can successfully impose humanitarian force to end ethnic cleansing, and keep casualties low, by using fighter and attack aircraft employing precision guided weapons (PGMs).

Addressing the issue of minimizing casualties, this study looks at the threat in Bosnia and argues that among all U.S. aircraft and weapons available for the mission, fighter and attack planes dropping PGMs would best keep casualties low. However, minimizing casualties is only a pre-condition for humanitarian force application. To be successful, U.S. air strikes also have to end the ethnic violence which Americans find so morally reprehensible. American strikes could accomplish this mission by attacking the Bosnian Serb firepower superiority over Bosnian government forces. Although many experts argue the Serbs are an unconventional force, the BSA has actually used its conventional advantage in tanks and artillery to advance against the Muslim government forces. U.S. air strikes could destroy this Serb edge by attacking their heavy weapons. This effort would entail not only direct attacks against the weapons, but also strikes against the military infrastructure which supports the Serb heavy weapons. Once this advantage is neutralized, Bosnian government forces could use their manpower advantage to push Serb forces back into pre-war intrastate boundaries. As this equilibrium is re-established, BSA forces would no longer be in a position to carry out ethnic violence and the U.S. objective would have been met.

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CHAPTER 1

INTRODUCTION

The most likely [twenty-first century] wars will be those to stop offensive behavior on the part of a country that is working its own agenda, that is trying to steal something from us or from some other country, or that is doing something entirely unacceptable to us.¹

Colonel John A. Warden III

From the bitter civil war in Bosnia-Herzegovina has emerged the types of unacceptable actions which Col Warden says will likely draw the United States into a post-Cold War conflict. Since the war's beginning in 1992, rampant Serbian nationalism has led to a campaign of genocidal ethnic cleansing against the Bosnian Muslims. Finding this mass violence appalling to their moral standards, many Americans have demanded their government intervene. However, although the killing is unacceptable, many experts, both military and civilian, assert this noble desire to "do something" is not an adequate reason to risk American lives.² They argue such involvement is well-intentioned but indistinctly defined. Therefore, humanitarian military intervention would only embroil America in a bloody ground conflict reminiscent of Vietnam. This study refutes that conclusion. It argues that the United States could effectively project military force into Bosnia by forsaking the use of ground forces and exclusively employing air power instead.

To some extent America has already adopted a policy of exclusively using air power in its policy toward Bosnia. Operation Deny Flight, launched in

early April of 1993, saw President Clinton ground the Serbian Air Force by dispatching U.S. fighters to patrol the Balkan skies. Then in August, when Serbian artillery assaults threatened to annihilate Sarajevo, the President threatened unilateral U.S. bombardment if the attacks continued.³

That statement signaled a change to the previously toothless U.S. Balkan policy of air patrols, food drops, and diplomatic posturing. Positive results of this get-tough policy came quickly. Several days later, Serb units staged a withdrawal from one of their two mountain top positions overlooking the Bosnian capital.⁴ But since that time, the Serbs have gradually renewed their attacks indicating the deterrence effect of air strikes has worn off. Now, to be successful in halting the ethnic violence, U.S. air power will most likely have to strike.

MEASURING SUCCESS

To evaluate the effectiveness of using air power in lieu of a more traditional ground-orientated force, it becomes necessary to establish criteria against which to measure success. In Bosnia no U.S. national vital interests are threatened. Instead ethnic violence tugs at American's heartstrings and the public's call for military intervention has a humanitarian basis. Therefore, the time honored American military strategy of destroying an enemy with an overwhelming combination of air, sea, and land power, is inappropriate.⁵ Post-Cold war humanitarian situations like Bosnia require a new measurement of success.

In its 1993 edition, the U.S. Army's keystone warfighting doctrine manual, FM 100-5 Operations, offers a suitable unit for measurement.

According to FM 100-5, the public places the following criteria on the use of U.S. military forces:

The American people expect decisive victory and abhor unnecessary casualties. They prefer quick resolution of conflicts and reserve the right to reconsider their support should any of these conditions not be met.⁶

In short, the American people expect their military to accomplish quick, decisive victories with a minimum of casualties. Furthermore, to prevent the concept of "humanitarian force" from becoming an oxymoron, in situations like Bosnia, the restriction on casualties must extend to enemy troops and non-combatants, as well as friendly forces. This monograph takes the FM 100-5 criteria, adds this further restriction on casualties, and uses it as a yardstick to measure the effectiveness of air strikes in Bosnia.

In making this measurement, this study remains predominately at the tactical level. Prussian military theorist Carl von Clausewitz emphasized "all strategic planning rests on tactical success alone, and that--whether the solution is arrived at in battle or not--this is in all cases the actual fundamental basis for the decision."⁷ Due to U.S successes in the 1991 Persian Gulf War, it is dangerously tempting to ignore the tactical level of war when discussing possible effects of air power. Since air strikes appeared decisive in Desert Storm, some armchair strategists and air power zealots now tend to use air power as a strategic magic wand.⁸ They would simply wave air power toward

Bosnia and envision the Serbians folding as easily as Iraq's legions. But Bosnia is not Iraq. While there are some useful comparisons between the two conflicts, fundamental differences exist in terrain, weather and military forces. Since these differences exist, one can speculate at length on strategic success, but if air strikes prove ineffective on the tactical level, the U.S. runs the risk of failure.

Finally, to judge the decisiveness of air strikes, it is essential to define an endstate. To assess the effectiveness of any military operation in the former Yugoslavia this final goal must be defined with clarity. Leaving this endstate open-ended makes it impossible to perform a cost analysis for proposed solutions. For this examination, an acceptable endstate is defined as one where ethnic cleansing has ended and the pre-civil war ethnic boundaries are re-established within Bosnia.

METHODOLOGY

As its primary method of analysis this study utilizes a dialectic approach. In a step-by-step process, it questions how well U. S. air strikes could satisfy the previously discussed criteria. To form a logical answer to this question, historical examples are used to provide possible positive and negative outcomes. These potential results are superimposed over the situation in Bosnia and critical analysis is applied to discern the most likely consequences of U.S. air strikes.

To facilitate this process, the criteria are sub-divided and evaluated

according to importance. In humanitarian situations, the issue of minimizing casualties has over-arching importance so this is the first issue addressed.

Chapter two examines which aircraft and weapon combinations would potentially result in the least amount of collateral deaths and destruction.

Chapter three takes the force package agreed upon in the previous chapter and looks at the direct effects it could have in Bosnia. This section deals with factors such as targets sets, munitions effects, weather, and terrain. Finally, since it is also important to consider what occurs after the bombing stops, chapter four examines long-term political solutions made possible by the tactical success of air strikes.

LIMITATIONS

A brief look at the Balkan war reveals the current conflict extends beyond a struggle between the Serbs and Muslims. One can count at least six different factions directly involved: the Muslims, the Croats, the Bosnian Croats, the Bosnian Serbs, the Krajina Serbs and the Serbs of the Federal Republic of Yugoslavia.⁹ While it is true the hostilities include all these factions, thus far in the civil war, the Bosnian Serbs have clearly been the aggressors and the Bosnian Muslims have been the recipients of the vast majority of the Serb attacks. The other groups, particularly the Bosnian Croats and Yugoslav Federal Republic Serbs, are involved, but the civil war is predominately a matter of Bosnian Serb versus Bosnian Muslim. If these two groups reach terms for conflict resolution the majority of the violence would end.

Therefore, even though this study sometimes addresses the secondary factions, it concentrates primarily on the Serbs and Muslims fighting within Bosnia.

OUTSIDE THE BOX

As described above, the internecine Bosnian fighting presents the U.S. military with a decidedly non-traditional mission. Aghast at the killing, and frustrated by ineffective diplomatic maneuvering, the U.S. public increasingly turns to its military for a workable solution. Yet, while expecting American forces to produce results, the public also demands casualties be kept to an absolute minimum. Military planners are thus challenged to develop a response which meets these strict criteria. Numerous civilian and military experts have taken a hard look at the problem and pronounced it unsolvable. They maintain military success inherently requires applying overwhelming combat power through a balanced application of ground, air, and sea forces. In Bosnia, the penalty for violating this principle would be a bloody ground conflict with no definable endstate.

The following chapters challenge this old-school military analysis by arguing Bosnia is a non-traditional conflict and therefore requires an innovative military solution. Due to the humanitarian nature of possible U.S. involvement, the methods for successfully employing military force lie "outside the box" which holds the traditional American ideas of waging war.¹⁰ In the Balkans, air power represents such a unique solution. Air strikes permit the effective use of power while satisfying the mandate for minimum casualties.

CHAPTER 2

WITH MINIMUM CASUALTIES

The United States has a clear humanitarian interest in preventing genocide and starvation, and the American people will within limits support intervention to deal with such tragedies. If Somali clans and Slavic groups are fighting each other, we will attempt to mitigate whatever horrendous consequences may flow from such violence. In such circumstances the American people may even accept some American casualties.¹¹

Samuel P. Huntington

Dr. Huntington's quotation portrays some prevailing American attitudes toward humanitarian military missions. It also illustrates the complicated dynamics which make it so difficult to translate America's humanitarian desires into an acceptable reality. To be effective, an equation for successful intervention must represent public support and total casualties as factors inversely proportionate. That is, acceptable force application has to keep casualties low to keep public support high. In Bosnia, the best force for accomplishing this goal would be one composed of fixed-wing, fighter and attack aircraft delivering precision guided munitions (PGM).

Since discussion without definition is difficult, it is necessary to define "limited casualties" before discussing how the above force package can gain this goal.¹² As Dr. Huntington states, Americans will accept "some casualties" in enforcing humanitarian goals, but when does this number become too high? Ten years ago, the number was something less than 241. That was the final body count of U.S. Marines killed in Lebanon on 23 October 1983

after a suicide bomber drove an explosives-laden truck into the makeshift U.S. barracks at the Beirut airport. Four months later, amidst crumbling domestic support, the U.S. pulled its troops out of Lebanon.¹³

In Somalia, America's first post-Cold War humanitarian effort, the acceptable total was less than 17. That number of U.S. soldiers died during the night of 3-4 October 1993. The deaths occurred when Army Rangers mounted a raid on the Olympic Hotel in Mogadishu in hopes of capturing Somali warlord Mohammed Farah Aidid.¹⁴ The killings triggered a dramatic drop in American support for the Somali venture. Back in December 1992, a full three-quarters of Americans surveyed expressed approval of the decision to send U.S. armed forces into the African nation.¹⁵ However Aidid's decision to turn peacemaking into bloody war-making reversed these numbers just ten months later. After the Ranger battle, 60% of Americans responding said they now disapproved of U.S. troops being in Somalia.¹⁶

These figures quite accurately depict America's reluctance to lose more than a handful of troops in humanitarian enforcement. They do not, however, reflect the full dimension of the issue. Americans also expect relatively low casualties among enemy forces. Looking back to the 1991 Gulf War reveals a pronounced U.S. sensitivity toward enemy losses.¹⁷ Perhaps the most publicized case involved the so called "Highway of Death." Late in the war, when Iraqi forces fled Kuwait City, their convoy was systematically decimated by coalition air forces. According to Desert Storm commander, General H.

Norman Schwarzkopf, the public's perception of these attacks as "wanton killing" led to a premature cease fire.¹⁸

Finally, American forces have strong moral and legal imperatives to avoid non-combatant deaths. As a rule, the U.S. military adheres to the customary principles of military necessity and humanity which require attacks to avoid or minimize civilian casualties.¹⁹ During the Gulf War, U.S. forces followed these customs even when it meant foregoing attacks on legitimate military targets.

Contrary to the admonishment against such conduct contained in Article 19, GWS [Geneva Convention for the Condition of Wounded and Sick], Articles 18 and 28, GC[Geneva Convention], Article 4(1), 1954 Hague, and certain principles of customary law codified in Protocol 1, the government of Iraq placed military assets (personnel, weapons, and equipment), in civilian populated areas and next to protected objects (mosques, medical facilities, and cultural sites) in an effort to protect them from attack.²⁰

Since Iraq's actions violated laws of armed conflict, coalition forces could have legally attacked these urban targets. In the end, moral imperatives to spare innocent civilians restrained the U.S. led coalition from making such attacks.

EVALUATION FORCE OPTIONS

As the previous examples demonstrate, to maintain public support U.S. combat forces must limit friendly, enemy and non-combatant casualties. This stipulation becomes particularly important in humanitarian situations where no compelling national interests kindle U.S. resolve. The Somalia situation

suggests ground forces can not effectively carry out this mission. This study argues that if America elects to use humanitarian force in Bosnia, air power could have more successful results.

This success hinges on selecting the right mix of aircraft and weapons for the mission. Air Force Manual 1-1, Basic Aerospace Doctrine of the United States Air Force, cautions that the objective determines which planes are best suited to a particular mission.²¹ Heeding that guidance, this chapter examines various aircraft and weapon combinations to determine which could best meet the all-important objective of limiting casualties in Bosnia.

In broad terms, combat aircraft available for use in Bosnia fall into three groups: bomber, attack and fighter aircraft. These aircraft can employ two kinds types of weapons. First, they can employ precision guided munitions (PGM), which are in some manner controlled all the way to target impact. These aircraft can also drop general purpose, or so called "dumb bombs," which fall ballistically to the target after release. PGMs, or "smart bombs" as they are popularly known, come in two types. Electro-optical weapons use a television camera in the nose of the bomb to locate the target. Laser guided bombs (LGB) follow a laser beam which is pointed at the selected target.

From the above list of aircraft and weapons, the military planner must select the combination most appropriate for a particular mission. In Bosnia, the first priority is to limit casualties. Therefore, the following discussion analyzes various aircraft and weapon combinations to identify which would

best minimize human losses.

Bombers With General Purpose Bombs

Bombers in the U.S. arsenal include the B-52 Stratofortress, the B-1 Lancer and the B-2 Stealth bomber. Since the B-2 has yet to become fully operational, this study addresses only the B-52 and the B-1.

Bombers have one distinct advantages over fighter or attack aircraft: payload. The B-52G can carry 51 MK-84 five hundred pound bombs in its internal weapons bays and on wing pylons.²² This far exceeds the capacity of the newest Air Force fighter, the F-15E, which carries only 24 such bombs. But bombers also have drawbacks. To carry these large payloads bombers are necessarily large. This size leads to a decrease in speed and maneuverability, making bombers susceptible to enemy attacks. Such attacks could lead to friendly loss rates inconsistent with the public's mandate to keep friendly casualties low.

Yet, it is unlikely the Bosnian Serb's antiquated air defense system could down even a single U.S. bomber. The BSA air arm has only a few air-to-air capable MiG-21s. It is doubtful that more than a couple of these are actually flying due to maintenance problems and a dearth of spare parts.²³ Thus, the U.S. holds an overwhelming edge in air superiority fighter aircraft which should quickly down any Serbian MiGs.

As for ground based air defense, the Bosnian Serbs maintain only a few radar-guided SA-2, SA-3 and SA-6 surface-to-air missiles (SAM) deployed

mainly near the Banja Luka airfield in northern Bosnia.²⁴ Much more prevalent are Serb anti-aircraft artillery (AAA) guns and hand-held infrared (IR) SAMs. Since 60% of the country is mountainous, potentially every elevated area provides BSA gunners with a firing position.²⁵ However, in past conflicts, U.S. bombers have survived air defenses more lethal than they would face in Bosnia.

Iraq, for instance, fielded an integrated air defense network significantly more sophisticated than anything the Bosnian Serbs control. Despite this threat, B-52s flew 1,624 missions without a combat loss.²⁶ This success can be traced to several factors which could easily be repeated in Bosnia. First, U.S. electronic warfare aircraft disrupted the Iraqi air defense network by using radar jamming and lethal anti-radiation missile (ARM) attacks. These attacks denied Iraqi SAM and AAA operators electronic early warning information and forced them into visual backup modes to acquire targets. In response to Iraq's degraded air defense systems, the B-52s quickly changed tactics. During the first few days of the conflict B-52s ingressed at altitudes below 500 ft to reduce exposure to SAMs. As the Iraqi air defense system collapsed, the B-52s found sanctuary at higher altitudes. Here the bombers avoided both radar guided SAMs and the ubiquitous barrage AAA which could not reach them.²⁷

Based on these results, it seems reasonable to assert that B-52s, or the

more capable B-1, could operate in Bosnia and keep their loss rates acceptably low. Unfortunately, although friendly casualties would be low, the same is not true for non-combatants. Neither the B-52 nor B-1 possesses a PGM capability. Instead, they use on-board radar to guide them to a bomb release point. At this point the crews release their payloads and the bombs "gravity fall" to the target.

Lacking a PGM capability, bombers are acceptable for area type targets but unusable for point targets. That is why, during the Vietnam War, B-52s maintained a safety margin of three kilometers between their designated targets and friendly troops. During the 1968 Khe Sanh battle, B-52s did drop closer than this to U.S. Marine defenders. However, these flights were aided by Combat Skyspot, a ground based radar which furnished the bombers with precise guidance queues.²⁸ Without a similar system, the demographics of Bosnia rule out using bombers. In Bosnia, 70% to 80% of the terrain is mountainous.²⁹ As a result, most industrial and civilian population centers are shoe-horned onto the remaining level ground. This proximity of civilians and prospective targets makes it unfeasible for bombers to expend area type munitions.

Fixed Wing Attack Aircraft with General Purpose Bombs

Fixed wing attack aircraft for a Bosnian mission include the U.S. Air Force A-10 Thunderbolt II; the U.S. Navy A-6 Intruder, A-7 Corsair and F/A-18 Hornet; and the U.S. Marine Corps AV-8B Harrier. These aircraft

normally perform the close air support (CAS) mission which places them close to friendly lines. Since they seldom fly deep into enemy territory, attack jets carry fewer self protection weapons, like air-to-air missiles, than deep strike fighters. Despite this lack of self protection, given the low technology nature of the Bosnia Serb air defense system, it would be reasonable to expect these aircraft to operate safely in Bosnia. In fact, the opposite is true. Attack aircraft would be vulnerable because they rely primarily on visual methods to deliver general purpose munitions.

A brief explanation of how these airplanes deliver bombs is necessary to understand this vulnerability. Most attack aircraft have sophisticated computers which continuously compute release parameters. These computations feed into an aiming sight which is superimposed on their windscreen "heads up display." Fighter pilots called this computer placed aiming reticle a "death dot" because the bombs faithfully impact whatever target the sight designates.

Although accurate, this bombing method has a major drawback making it of questionable use in Bosnia. To place the sight, the pilot must operate in daylight and at altitudes which allow him to visually acquire the target. Generally this forces the pilot to fly below 10,000 ft. At this height enemy gunners can visually direct deadly AAA and SAM fires. Compounding the problem, this altitude significantly decreases the reaction time pilots have to maneuver away from this incoming ground fire. The deadly effects of low altitude weapons delivery were highlighted during the final 10 days of Desert

Storm. During that period 10 coalition aircraft were lost to Iraqi AAA and hand-held IR SAMs.³⁰ Overall, 15 coalition aircraft were downed by AAA or IR SAMs. This came as a direct result of aircraft operating at lower altitudes to ensure target acquisition and destruction.³¹

Dropping bombs from higher altitudes is the only way to decrease these loss rates. But, this makes it difficult for the pilot to acquire targets and accuracy decreases as a result. As previously discussed, sacrificing accuracy would lead to higher civilian casualty rates in Bosnia where targets and civilians are intermixed. This potential for civilian casualties, along with the risk of losing U.S. aircrews, rules out using the combination of attack planes and general purpose bombs in Bosnia.

Fighter Aircraft with General Purpose Bombs

Fighter aircraft available to employ air-to-surface munitions in Bosnia include the U.S. Air Force F-15E, F-16, F-111 and the F-117A. Unlike attack aircraft, these platforms are designed to fly interdiction sorties deep into enemy territory. To accomplish this mission, these jets come equipped with a full array of offensive and defensive weapons. Still, despite these self protective systems, if called upon to attack with general purpose bombs, these aircraft would suffer from the same vulnerabilities which plague attack aircraft.

Essentially, fighter aircraft drop dumb bombs in the same manner as attack jets. That is, they must visually acquire their target, align their bombing sight upon it, and then release their weapons. Again, the limiting factor in this

delivery method is the human eye. Pilots must fly low enough to visually acquire targets before rolling in for an attack. At these lower altitudes, the aircraft becomes vulnerable to ground fire and the pilot's reaction time is significantly decreased. An example is the 19 January 1991 F-16 raid on Baghdad in which two aircraft were shot down by optically launched enemy SAMs. These losses violated the emerging U.S. dictum that "no target is worth an airplane" and brought an end to daylight bombing attacks on Baghdad.³² Similar results are likely if these same type of attacks are attempted in Bosnia. Hence, fighter aircraft dropping general purpose bombs should not be considered.

Fighter Aircraft With PGMs

The same U.S. Air Force fighters just discussed could attack Bosnian targets after exchanging their general purpose bombs for PGMs. Uploading smart bombs would enable these aircraft to meet the objective of keeping casualties rates low enough to ensure U.S. public support. Dramatic evidence reaching as far back as the Vietnam War supports this assertion.

During the 1965 "Rolling Thunder" bombing campaign against North Vietnam the U.S. Air Force flew 120 sorties and expended over 600,000 pounds of general purpose munitions against North Vietnam's combination rail and highway bridge at Thanh Hoa.³³ During this effort, over a score of F-4 and F-105 aircraft, along with their crews, fell victim to Vietnamese AAA guns. Sadly, these airman died in a failed effort because the bridge withstood

all these attacks. In 1972, the Linebacker I campaign brought renewed attacks against the bridge. But this time the U.S. jets carried the recently fielded Paveway laser guided bombs (LGB). On 13 May 1972, a single flight of eight F-4s struck the bridge and left it unusable. All the aircraft survived this mission.³⁴

Although technologically sophisticated weapons, the reason PGMs increase survivability is relatively simple: they overcome the limitations of human sight. In Desert Storm F-111s flew sorties using the Pave Tack laser designator system.³⁵ Pave Tack is an imaging infrared system (IIR) which converts an object's reflected IR energy into a visual display. The Pave Tack pod also generates a laser beam used to guide LGBs to a designated target. As sensational Desert Storm cockpit video tapes confirmed, systems like Pave Tack allowed aircrews to attack at night. This prevented visual acquisition by enemy gunners and friendly loss rates were kept low.

During daylight hours, electro-optical PGMs extend target acquisition ranges beyond the limits of human eyesight. A look at the guided bomb unit (GBU)-15 shows how such systems work. The optical version of the GBU-15 has a camera located in its nose assembly. Therefore the delivery aircraft only has to point and release the weapon in the general direction of a target. Thus, standoff range is increased; the target area and specific aiming point can be located after release from video transmitted from the weapon's camera.³⁶ This feature leaves the pilot free to turn his aircraft away from high threat areas

which increases survivability. During the Gulf War, GBU-15s, delivered from F-15Es and F-111s routinely struck heavily defended targets without losing a single plane or pilot.³⁷

Since visually guided AAA and SAMs represent the major threat in Bosnia, PGM stand-off capabilities would limit friendly casualties. These same weapons would also keep civilian loss rates low. As previously discussed, targets and civilians are in close proximity in Bosnia thus preventing the dropping of indiscriminate free-fall ordnance. PGMs have the demonstrated accuracy to solve this problem. During the 1986 U.S. raid on Libya, F-111s dropped LGBs on Muammar Qaddafi's downtown Tripoli home, yet caused few civilian casualties.³⁸

This accuracy continued to improve over time. A post-war analysis of F-117 Desert Storm missions revealed over 90% of the Stealth fighter's bombs impacted less than 10 feet from the desired impact point.³⁹ According to the human rights group, Middle East Watch (MEW), the F-117 accuracy left Baghdad, the site of most Stealth attacks, remarkably intact. Reporting after the war, MEW found military targets in Baghdad standing but with interiors gutted by precision attacks. Certainly some Baghdad civilians died, but the vast majority of Baghdad homes and offices sustained little damage.⁴⁰

The accuracy which minimized civilian deaths in Desert Storm also limited casualties to enemy troops. For instance, to degrade the Iraqi command and control network, coalition bombers used LGBs to drop Baghdad bridges.

Attached to these bridges were the multiple fiber-optic links that provided Saddam Hussein communications to his field commanders.⁴¹ The strikes eliminated the need to strike multiple Iraqi military command and control facilities located throughout the country. As a result, fewer Iraqi soldiers died. Similar attacks against key weak points would limit enemy deaths in Bosnia. Hence, fighter aircraft dropping PGMs would meet the criteria for limiting enemy casualties.

Attack Aircraft With PGMs

Although generally not as sophisticated as the systems on fighter aircraft, most attack aircraft can also deliver precision munitions. The A-10 lacks an IR targeting pod but still can employ both the electro-optical and IR versions of the air-to-ground (AGM)-65 Maverick missile. Mavericks use a camera or IR seeker capable of presenting the pilot with a magnified image of the target. This magnification feature gives A-10s a significant stand-off capability, yet allows them to retain excellent accuracy.⁴² Most U.S. attack aircraft have comparable systems making them as effective as fighter aircraft in limiting friendly, enemy and civilian casualties. Thus they would be suitable for use in Bosnia.

SOLVING THE EQUATION

As detailed earlier, the United States has a vested humanitarian interest in stopping the ethnic violence in Bosnia. However, while the American public

expects its armed forces to perform this non-traditional role, the people also reserve the option of withdrawing their support if excessive casualties occur.⁴³ This caveat extends to not just friendly casualties but enemy forces and non-combatant populations as well. Thus, a successful equation for force projection in Bosnia requires keeping casualties low so public support remains high. With the proper mix of aircraft and weapons, U.S. air power can maintain this delicate balance. This correct combination is one composed of fighter and attack aircraft employing precision munitions.

CHAPTER 3

HOW TO WIN

Their [the Bosnian Serb Army] successes have been almost entirely due to their overwhelming superiority in firepower over the Moslem and Croat forces. However, whenever they have met a well armed and motivated opponent they have suffered defeat or severe setback.⁴⁴

Dr. Milan Vego⁴⁵

As the previous chapter established, the U.S. could launch air strikes against Bosnian Serb forces while simultaneously complying with the public's mandate to minimize casualties. Unfortunately, this merely satisfies a precondition for humanitarian force application; it implies nothing about the ultimate success of such a venture. From America's viewpoint, success in Bosnia equates to ending the ethnic violence which they find so morally reprehensible. Therefore, while it is necessary for air strikes to be relatively bloodless, they must end ethnic cleansing to be judged successful.

The quotation above reveals the way to achieve this success. As Dr. Vego states, the BSA firepower superiority has enabled Serb troops to conquer Muslim portions of Bosnia. The campaigns of genocide have been rear area actions occurring in the wake of these Serb advances. Air strikes can achieve success in Bosnia by destroying the Serb heavy weapons capability. Once this Serb military edge is gone, the Muslims have the manpower to regain their losses and stop the genocide.

A Question of Symmetry

Opponents of air strikes vigorously condemn the above conclusions.

Senior U.S. Air Force officials contend the Bosnian Serb military does not constitute a unified force in the traditional sense. Instead, they say it is a loose collection of groups running the spectrum from street gangs to warlords to guerrillas.⁴⁶ Any suggestions that U.S. forces fight this unconventional military hodgepodge have brought strong objections and warnings of another Vietnam in waiting.

It is doubtful Bosnia would be another Vietnam. If air strikes are used, certainly it would not be so in terms of casualties. Ultimately though, would air strikes prove as ineffective in Bosnia as U.S. combined air, land, and sea forces were in Southeast Asia? To answer this question, one must address the issue of military symmetry.⁴⁷ Some Vietnam analysts claim the Vietnamese communists developed a new method of war for which there was no known counterstrategy.⁴⁸ This strategy, known as "dau tranh," had the following cornerstone tenants.

The Vietnamese communist erased entirely the line between military and civilian by ruling out the notion of noncombatant. Their strategy precluded, by definition, the disinterested onlooker. Not even children were excluded--particularly not children, one might say. All people became weapons of war--that is the meaning of the strategy--and all are expendable as any weapon is expendable in war.⁴⁹

Vietnam critics maintain U.S. efforts to counter dau tranh with a conventional military force were doomed from the start. U.S. tanks,

helicopter gunships and conventional infantry were optimized to kill forces of similar composition. Since the communists used unconventional forces, their units were not symmetrical with those the Americans fielded. Possessing weapons ineffective to combat dau tranh, the U.S. found itself in an unwinnable war.

If the BSA truly is another unsymmetrical force, it would likely be invulnerable to U.S. conventional attacks. However, despite what critics of Bosnian military intervention claim, the BSA is actually a hybrid force. Admittedly, many units are little more than undisciplined partisan gangs bent on pillage and plunder. However, the BSA's real power lies in its conventional arm. This long-standing force is comprised of indigenous Bosnia Serb units once belonging to the Yugoslav People's Army (JNA) 2nd military region.⁵⁰

Using a heavy weapons advantage, this conventional force has been responsible for Serb victories over the Muslims. In a typical battle, these BSA forces invest small Muslim villages with stand-off artillery and tank fires. Muslim residents not killed outright eventually flee to avoid starvation. If artillery alone proves insufficient to drive away the locals, Serb irregulars move in and "ethnically cleanse" the remaining weakened villagers.⁵¹ From this example, one sees the Serb partisan forces carry out ethnic cleansing only after BSA regular forces have decided the issue.

This description of Serb tactics is important for two reasons. First it

shows Serb conventional forces enable ethnic cleansing. Second, it points to heavy weapons as the Serb Army's "center of gravity." According to Clausewitz, the Serb tanks and guns thus become "the point against which all our energies should be directed."⁵² Most important, unlike Vietnam, this center of gravity is a conventional force, making it symmetrical with U.S. capabilities. As the remainder of this chapter explains, this symmetry would permit U.S. air strikes to destroy this BSA center of gravity.

The Chain

Comparing BSA capabilities with those of Bosnian government forces shows just how important heavy weapons have been to Serb success in the ongoing civil war. With an estimated 40,000 troops, the BSA is significantly smaller than the official Army of Bosnia-Herzegovina which numbers between 50,000 and 70,000 soldiers. The BSA has compensated for this manpower shortage by utilizing their overwhelming advantage in heavy guns and tanks. While the BSA has nearly 300 tanks and 600 artillery pieces, the government troops have only small arms and a handful of tanks and artillery pieces.⁵³ This firepower advantage has allowed the Bosnian Serbs to occupy over 70% of the country and wage their genocidal campaign against the Muslims.

The popular argument against air strikes says these artillery pieces and tanks are invulnerable to air attacks. Once air strikes start, opponents claim the Serbs would simply hide their equipment amongst the country's rugged terrain. This reasoning prompted MG Lewis MacKenzie, former commander of U.N.

troops in Sarajevo to comment, "the only thing air strikes [would] prove is that air strikes won't work."⁵⁴

MG MacKenzie's pessimistic appraisal remains true only if one limits air strikes to direct attacks on individual tank and gun emplacements. However, it is possible to degrade the Serb heavy weapons capability without directly bombing their gun emplacements. The key to this indirect approach is finding a vulnerability on which the Serb center of gravity depends.⁵⁵ For example, to function effectively, tanks and heavy weapons rely on a series of events. Guns and tanks require timely delivery of ammunition, fuel, and spare parts. Weapons crews need periodic supplies of food and water. A command and control element is required to manage these logistic efforts.

For purposes of discussion, it is useful to liken this interlocking sequence of events to a chain.⁵⁶ Utilizing the chain analogy, this chapter looks at the guns and tanks themselves as the first link and then works its way "back up the chain." In doing so, it explains how these targets would be susceptible to U.S. aircraft employing PGMs.

Tanks and Artillery

If individual tanks and artillery are constantly moving, they are not particularly vulnerable to air strikes. Conversely, if placed in fixed positions they become susceptible. Speaking before the U.S. Senate Armed Services Committee, Marine Corps MG John Shehan said U.S. reconnaissance could clearly locate only about a quarter of the 600 BSA artillery pieces.⁵⁷ The

general intended this statement to demonstrate the futility of attacking gun sites. However, the same numbers can provide a positive slant.

If reconnaissance assets locate 25% of the gun emplacements, this represents approximately 150 fixed targets for air strikes. Even if only partially successful, strikes against this number of positions would significantly attrit the BSA artillery batteries. Granted, the attacks would cause Serb gunners to remove their weapons to hidden positions. However, before the Serbs could withdraw, the initial air strikes would destroy many of their weapons. Pilots would find BSA heavy weapons in well established positions overlooking besieged Muslim cities.

According to Western intelligence reports, the Bosnian Serbs have about 100 artillery pieces and a dozen tanks around Sarajevo. United Nations officials in Sarajevo say the total is closer to 250. Fifteen artillery pieces and six tanks have been reported near Srebrenica and a smaller number near Zepa. There are about 20 artillery pieces near Tuzla.⁵⁸

These figures probably fluctuate somewhat as Serb offensives come and go, but aircrews would find many of these well known positions still occupied. Once located, past experiences prove precision weapon attacks are effective against this target set.

During Desert Storm, by far the greatest impact on Iraqi armor came from LGB attacks which started on 6 February 1991.⁵⁹ On this date, coalition aircrews discovered "tank plinking." Until this time, Iraqi commanders had protected their tanks by burying them in sand. This technique proved effective in shielding the armor from allied planes employing armor piercing cluster

munitions. However, F-111 crews discovered that even buried up to their turrets, the tanks still gave off an infrared signature which laser targeting pods could detect. Within a week, coalition planes had "plinked" hundreds of dug-in tank and gun emplacements with 500-lb LGBs.⁶⁰

Despite this success, critics maintain environmental factors would confound a similar effort in Bosnia. In contrast to Iraq's desert landscape, they point out the densely vegetated Dinaric Alps dominate most of Bosnia-Herzegovina. Ostensibly, the needleleaf forests which cover these rugged mountains provide excellent concealment all year round.⁶¹ Without question, this dense foliage would prevent the cameras in electro-optical weapons from seeing the target. Therefore these weapons are of limited use in a densely vegetated environment.

Laser guide munitions would enjoy more success in this situation. Like sand, trees and underbrush can not entirely mask the IR energy emitted by large metallic objects such as tanks or artillery pieces. IR targeting pods on overhead aircraft can therefore locate these target "signatures" and direct LGBs against them. Vietnam verifies this concept. During that war, the U.S. mounted several aerial interdiction campaigns against the Ho Chi Minh trail. Code named "Commando Hunt," these operations sought out supply convoys trafficking the jungle trails running through Laos and Cambodia.⁶² During the latter Commando Hunt operations F-4s, carrying recently fielded PGMs, successfully targeted AAA sites camouflaged amongst the jungle foliage.⁶³ Today, U.S. aircraft would enjoy similar success against Serb gun positions

camouflaged in the wooded hills overlooking Muslim cities such as Sarajevo.

The abysmal Balkan weather stands a better chance of disrupting U.S. aerial attacks than the Bosnian forests. In Desert Storm the coalition encountered weather conditions forecasters called the worst in 14 years.⁶⁴ Several times during the war, low ceilings and blowing sand allowed only helicopters to successfully operate.⁶⁵ Even if U.S. fighters did manage to get airborne during these periods of marginal weather they often could not employ PGMs. On the 2nd and 3rd days of the air war, more than half the F-117 sorties failed to deliver their weapons due to low clouds over Baghdad.⁶⁶

Climatic conditions in central Europe would make the Desert Storm weather look mild in comparison. By some estimates, pilots flying in a European theater would encounter low ceilings twice as frequently as those occurring during the Gulf War.⁶⁷ A U.S. Air Force climatic survey reveals the extent of the problem. The study finds ceilings of less than 3000 feet obscure the skies over Sarajevo 52% the time during November, 63% of the time in December and 65% of the time in January. Fortunately, these conditions improve significantly in the summer. In May and June 3000 foot ceilings occur 13% of the time and only 12% of the time in July.⁶⁸

This inclement weather would have pronounced negative effects on PGM employment. Rain, fog, and clouds all render TV weapons virtually useless since the weapon's seeker head can not acquire the target. The same conditions degrade IR weapons, arguably to a greater extent. Moisture in the

form of rain or humidity dissipates IR energy, thus preventing LGBs from locating their targets. During the Balkan winter rainfall occurs on 15 or more days each month. Conditions improve in the summer, yet even in July and August it rains on an average of 10 days each month.⁶⁹

If the U.S. commences air strikes, BSA tank and artillery commanders will undoubtedly use the weather as an ally. To counter, American planners would be well advised to initiate the campaign during a period of generally good weather. This is not to imply a winter campaign would fail outright, it would, however, be less effective against targets like tanks and heavy guns. The enemy would soon learn to hide their guns during good weather. Then, when low clouds rolled in, they could unmask their weapons and resume shelling Muslim cities. Eventually U.S. attacks could silence these barrages by attacking targets farther up the chain. Still, if time and conditions permit, logic would favor beginning air strikes during the summer months.

Lines of Communication

To continue with the analogy of likening Serb heavy weapons capability to a chain, one can picture the weapons themselves firmly linked to a logistical lifeline. It is a military reality that tanks and guns require periodic replenishment with bullets, repair parts and fuel. They also need crews who in turn require food and clothing. In Bosnia, the rugged terrain restricts delivery of these commodities to a few roads and railroads. This limited transportation system represents an "achilles heel" which air strikes could quickly and

decisively penetrate.

The steep slopes, incised valley walls, rock outcrops and narrow basins of the Dinaric Alps restrict vehicular traffic in Bosnia to roads and trails.⁷⁰ Making trafficability worse, the only two major highways in the former Yugoslavia both bypass Bosnia. The secondary roads which do run through the country are characterized by steep grades with hairpin turns, cuts and many bridges of unknown classification.⁷¹ The restrictive nature of this transportation network forms a bottleneck which air strikes would quickly close.

Historical examples support this statement. In 1972, F-4s armed with LGBs destroyed the Thanh Hoa rail and highway bridge on their first attempt. Before these attacks, 120 sorties had been unsuccessful in destroying this critical North Vietnamese line of communication. In Laos and Cambodia, U.S. aircraft used precision weapons to cause landslides which blocked portions of the Ho Chi Minh trail.⁷² Using this technique, air strikes could collapse rocky overhangs and close many Serb supply routes.

Destroying the country's many bridges would rapidly paralyze road traffic. During the last month of the Desert Storm air campaign, U.S. aircraft began attacking Iraqi bridges crossing the Tigris and Euphrates rivers. This effort enjoyed considerable success. By the time of the cease fire, 37 bridges were destroyed and nine more severely damaged. This represented two thirds of the bridges on the main Iraqi lines of communication.⁷³

Like the road network, air strikes would quickly destroy the limited rail system in the Bosnian interior. Rail infrastructure in Bosnia is severely restricted due to the mountainous terrain. Additionally, the many streams and valleys result in numerous railroad bridges and over 650 tunnels.⁷⁴ In Iraq, there were nine railroad bridges crossing the country's two rivers. Coalition aircraft using precision weapons dropped all nine in a matter of days. Similar attacks would quickly shut down the Bosnian rail network.

Finally, the inclement Balkan weather would not prove a major obstacle to strikes against Serbian lines of communication. When compared to strikes against individual tanks and gun emplacements, the attacks against lines of communications would require substantially fewer sorties to be effective. By targeting only a few key roads and railroads, air strikes could shut down major BSA resupply routes. All the sorties necessary could be flown during a few days thus mitigating the effects of unfavorable weather.

Command and Control

As discussed earlier, many experts contend Serb forces act independently, or are at best highly decentralized. Likewise, they state this force possesses no command and control network. This characterization fits many of the quasi-military partisan units running rampant behind Serb lines. However, it becomes suspect when applied to the units controlling the BSA heavy weapons. If one looks at the siege of Sarajevo, it bears the earmarks of a centralized military effort. Serb units first captured strategic high ground. Next they

moved in hundreds of heavy weapons. Then, weapons were precisely arranged to cut all approaches to the city. In the following months, these guns received continuous replenishment of ammunition and spare parts. This effort hardly seems the work of a marauding band of thugs. In reality, the units mounting this operation are Serb conventional forces and their efforts are coordinated through a traditional command and control network.⁷⁵

This command and control system comprises another vulnerable link in the heavy weapons chain. When Josip Tito united Yugoslavia after World War II, his communist orientation, coupled with a refusal to join the Warsaw Pact, angered both East and West. Seeing enemies on all sides, Tito fortified the mountainous Bosnia republic into a fall-back redoubt.⁷⁶ Tito's military infrastructure remains today and is utilized by the BSA. For instance, BSA commander Lieutenant General Ratko Mladic originally coordinated the effort against Sarajevo from a headquarters complex in the nearby town of Pale. In February, he moved to an underground bunker 55 kilometers north of Sarajevo. From this complex he continues to direct BSA operations using multi-channel radios and secure communications to all his subordinate commanders.⁷⁷

The U.S. Air Force has a weapon, the GBU-28, especially designed to destroy these kinds of bunkered communications nodes. Developed in a rush program during Desert Storm, this 4,700-lb weapon can penetrate 20 feet of concrete or 100 feet of earth.⁷⁸ The BSA command posts offer little

protection against this munition. Using the GBU-28 to destroy these bunkers would force Serb field commanders into inefficient, autonomous roles. In this manner, air strikes against command and control facilities would help unhinge the Serb firepower advantage.

The Chain Broken

In the final assessment, air strikes carry the potential to destroy the Serb firepower advantage. However, to achieve this destruction, the attacks can not be piecemeal, but must instead target the entire length of the heavy weapons chain. This means striking not only the guns, but also supply sources and routes as well as command and control nodes. Denied their heavy weapons, the Serbs would lose their military advantage. No longer nailed down by BSA artillery barrages, government forces could capitalize on their manpower advantage to launch new offensives and regain lost territories. In the process, government troops would also push out the marauding Serbian irregular forces responsible for the ethnic violence.

CHAPTER FOUR

ENSURING VICTORY

Because there has been so much killing of each other's mothers and children, there can be no other solution than one that separates the parties and establishes a rough equilibrium among them.⁷⁹

Gen Lewis MacKenzie⁸⁰

As described in the last chapter, air strikes would allow the Bosnian government forces to initiate offensives and regain territories lost to the Serbs. In the process, government troops would also push back the Serb irregulars responsible for ethnic atrocities. Once this occurs, air strikes will have accomplished the goal of ending ethnic cleansing. At this point, the U.S. must have a strategy for conflict termination which addresses two issues. First, the Muslim offensive will have to be halted. Next, a permanent political solution has to be implemented. Unless the U.S. can implement such a pre-arranged strategic plan, the violence will likely begin anew once the America terminates the air strikes.

Chapter one detailed an acceptable endstate in Bosnia as a return to the pre-civil war ethnic cantons. These boundaries will be re-established as the Muslim offensives progress and the Serbs retreat to the safety of their ethnic enclaves. However, it would be naive to believe the government forces will then voluntarily stop the offensive. Odds are the Muslims will be bent on revenging the ethnic violence visited upon them. Unless the U.S. has the leverage to halt the Muslims, the probability exists that government forces would storm into ethnic Serb territories and began atrocities of their own.

Fortunately, the U.S. can influence the Bosnia government actions. In December 1992, Bosnian foreign minister Haris Silajdzic told the United Nations his country would happily trade U.N. relief convoys for air strikes against BSA artillery positions.⁸¹ As this statements reveals, the Bosnian government realizes heavy weapons represent the strength of the BSA. If these weapons are eliminated, the Muslim infantry forces have the strength to splinter the Serb encirclement. By breaking the Serb siege, the government would eliminate its dependence on U.N. relief efforts, hence the offer to trade U.N. convoys for air strikes.

The U.S. can take advantage of this government willingness to bargain in return for air strikes. Before the U.S. agrees to strike, the Muslims must first agree to observe international rules of armed conflict. Specifically, they must pledge not to engage in reprisals against ethnic Serb populations. Additionally, once the government troops reach the pre-civil war ethnic boundaries within Bosnia, the offensive must halt. The Muslims have little choice except to agree with these U.S. demands. If the Bosnia government reneges, the U.S. must make it clear than American support will end.

The American government can also make air strikes contingent upon Bosnian agreement to a peace plan once the pre-conflict boundaries are re-established. Several plans to partition the country already exist. Perhaps the best known is the Vance-Owen plan which proposes to carve Bosnia into 10 semiautonomous provinces, each dominated by an ethnic group.⁸² In reality,

the specific plan agreed upon is much less important than the Bosnian government's commitment to a lasting peace accord.

Conspicuously absent here is a discussion of the Serbian role in a political solution. Once the government offensive halts and the Muslims agree to a peace proposal, there seems a good chance the Serbs will also agree.

Currently there is widespread disenchantment among the Serbs with nationalist desires to establish a "greater Serbia." Instead, in the conquered Muslim territories, Bosnian Serbs have found only empty streets, idled factories and promise of little except miserable subsistence for years to come.⁸³ These bleak prospects have infected everyday Serbs with a profound sense of war weariness.⁸⁴ This feeling can only be intensified once BSA forces begin to retreat.

Forced to relinquish their territorial gains, and with their military advantage destroyed, it would seem reasonable to feel the war weary Serbs would be prime for a peace settlement. Those who oppose U.S. intervention will decry this conclusion as nonsensical or blindly optimistic. It might be. But then, until recently, a peace plan between the Palestine Liberation Organization and Israel seemed just as farfetched.⁸⁵

Finally, even if the Serbs hold out against a political settlement, air strikes will still have met the near-term objective of ending ethnic cleansing. So while negotiations for a permanent settlement may drag on, the mass killing of innocents will not.

CHAPTER FIVE

CONCLUSION

We can now see that in war many roads lead to success, and that they do not all involve the opponent's outright defeat.⁸⁶

Clausewitz

This study maps out one non-traditional road to success in Bosnia. It is not a terrestrial route and does not wind through the treacherous front lines of the Bosnian civil war. Instead, it is a aerial path, and therein lies its logic. It reaches the objective but avoids many dangers associated with a ground-orientated route.

However this airway is not without obstacles of its own. Humanitarian missions present U.S. military planners with unique, new problems. In Bosnia, Americans are not overly concerned with which faction wins; they do, however, deeply care about halting the ethnic violence. Thus, by being apolitical, Bosnia is also atypical; no communist insurgency challenges democracy, no dictator threatens the country's oil supplies, no state-sponsored terrorism has taken American lives.

This non-traditional nature of humanitarian intervention necessitates an innovative military solution. Americans want the ethnic cleansing to end and they are willing to commit U.S. military forces to achieve this endstate. Still, since no U.S. vital interests are threatened, the American public insists casualties be kept to an absolute minimum. Making the mission more complex, this demand to minimize casualties does not only apply to American

lives. Since Americans want humanitarian intervention to stop the human carnage, it would be the height of hypocrisy if American forces also inflicted massive casualties on enemy forces, or worse yet, on non-combatants. By inference then, the limitations on casualties extends to all the various factions involved in the Bosnian Civil War.

Consequently, U.S. military planners have the challenge to take effective action and simultaneously fulfill the public's mandate for minimum casualties. Many military professionals maintain this is an impossible task. Logic states military force is inherently violent and its application is anything but humanitarian. The tragic killing of U.S. servicemen in Beirut and Somalia seems to validate this thinking.

Still, it is possible to project power while limiting casualties in Bosnia. This requires abandoning the use of ground forces in favor of aircraft employing precision munitions. The Bosnian Serbs possess only a rudimentary air defence network. As the U.S. Air Force proved in Desert Storm, it can eliminate an air defense system many times more sophisticated than anything the Serbs could field. Given this, U.S. aircraft flying over Bosnia airspace would operate in a low-risk environment, thus keeping friendly casualties well within the limits needed to maintain public support.

Additionally, by employing PGMs, air strikes would satisfy the requirement to limit the number of casualties to enemy troops as well as non-combatants. This study cited numerous examples from previous U.S. wars

where PGMs destroyed targets, yet limited collateral damage. The demonstrated accuracy of PGMs made this possible. Certainly, there are no guarantees that air strikes would be entirely bloodless. However, enemy and civilian casualties would be low enough to make them commensurate with the U.S. public's concept of minimal casualties.

While essential, this requirement to minimize casualties is still only a precondition for initiating air strikes in Bosnia. Meeting this precondition does not ensure the strikes can achieve the objective of eliminating ethnic cleansing. Many critics claim the Bosnian war has an unconventional orientation and draw parallels to the failed U.S. intervention in Vietnam. However, Bosnia is not Vietnam. While the Serbian forces do indeed include non-traditional elements, their real source of power lies in a heavy weapons superiority over the Muslim government sources.

These tanks and artillery pieces constitute a decidedly conventional component of the BSA. As such these weapons represent an avenue of symmetry between U.S. and BSA forces. By utilizing this avenue, U.S. air power can destroy the Serb firepower superiority. However, this would not be a simple mission. Due to the difficult Balkan environment, direct attacks on the weapons themselves are not enough. For success, air strikes must also use indirect attacks on the equipment and logistic "chain" which keeps the Serb heavy weapons in action.

Since Muslims forces outnumber those of the Serbians, once the Serb

firepower edge is eliminated, government forces can initiate offensives to regain their lost territories. As these advances progress, they would roll back not only the Serb conventional forces, but also the partisan irregulars primarily responsible for the campaign of ethnic cleansing. As this occurs, the U.S. must implement plans for conflict termination and long-term political solution.

This can be done because the Bosnian government realizes it needs American assistance to break the Serb sieges. The United States government can use this situation as leverage against the Muslims, forcing them to halt their advances once pre-civil war boundaries are reached. Additionally, before the U.S. agrees to strike, the Muslims must agree to adopt a post-conflict peace plan. At the same time, the U.S. can press the Serbs to join the settlement. Unable to maintain their war gains and suffering from war weariness, there seems a reasonable chance the Serbs will cooperate. Of course, the Serbs might doggedly refuse to any agreements. Even so, the genocide will have stopped and negotiations can proceed in the absence of further massive bloodshed.

These obstacles, while difficult, are not insurmountable and do not invalidate the conclusions of this study. Presented here is a sketch designed to justify using air strikes. It would be unexcusably naive to believe problems will not arise as this blueprint is transitioned into a full-fledged plan. Still, as this study demonstrates, the concept is sound. Properly planned and executed, air strikes can successfully project humanitarian force into Bosnia. Once initiated,

these strikes would end ethnic cleansing, do so in a manner acceptable to the American public, and enhance the chances for a lasting Balkan peace.

NOTES

1. John A. Warden III, "Employing Air Power in the Twenty-First Century," The Future of Air Power in the Aftermath of the Gulf War (Maxwell Air Force Base: Air University Press, 1992), p. 59.
2. David E. Jeremiah, "What's Ahead for the Armed Forces?" Joint Forces Quarterly, Summer 1993, p. 31.
3. B.J. Cutler, "Whether the Planes Fly and Bombs Fall is up to the Serbs," Minneapolis Star Tribune, 9 August 1993, p. 11.
4. John Pomfret, "Serbs Return Sarajevo Heights," The Washington Post, 10 August 1993, p. 10.
5. While many sources discuss the United State's tendency to wage war based on a strategy of annihilation, perhaps the most concise presentation is made in Russell F. Weigley's The American Way of War (Bloomington: Indiana University Press, 1973).
6. U.S. Department of the Army, FM 100-5 Operations, June 1993, p. 1-3.
7. Carl von Clausewitz, On War, trans., and ed. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), p. 386.
8. In On War, Clausewitz coins the term armchair strategist in the final paragraph of book five. Here, he ridicules academics who argue a military force can achieve victory merely by hold strongly defensible positions. Clausewitz argues it is an empty fantasy to maintain that simply occupying commanding terrain will lead to victory. "In reality, the occupation is nothing but a raised arm, and the position itself only a lifeless toll, a mere potentiality that needs an object for its realization, a simple plus or minus sign without any value attached. Similarly, although air power was decisive in Desert Storm, it is a "mere potentiality" in Bosnia. It has no value unless one determines what tactical effects air strikes could have against the Serb aggressors.
9. On 1 October 1993, the author sent a letter to U.S. Air Force Chief of Staff General Merrill A. McPeak asking him to comment on the conclusions of this monograph. General McPeak tasked MG Edwin E. Tenoso, Director of Operations for the Air Force Deputy Chief of Staff for Plans and Operation (USAF/XOO), to provide a reply. MG Tenoso's response disagreed with this study saying air strikes, undertaken in isolation, would not end the fighting in the Balkans. In his reply, MG Tenoso pointed out the scope of the fighting in Bosnia encompassed more than just the Serbs and the Muslims. The letter

identified the six different factions referred to here.

10. On 28 October 1993, BG Randolph W. House, Deputy Commandant, U.S. Army Command and General Staff College, stressed the importance of "thinking outside the box" while addressing students enrolled in the Advanced Military Studies program at Ft. Leavenworth, Kansas.

11. Samuel P. Huntington, "Keynote: Non-Traditional Roles," in Non-Combat Roles for the U.S. Military in the Post-Cold War Era, ed. James R. Graham (Washington D.C.: National Defense Press, 1993) p. 11.

12. James J. Schneider and Lawrence L. Izzo, "Clausewitz's Elusive Center of gravity," Parameters, September 1987, p. 46, reprinted in U.S. School of Advanced Military Studies Course 1 textbook Foundations of Military Theory (Fort Leavenworth: U.S. Army Command and General Staff College, 1990), p. 2.

13. "Marines Shouldn't have had to Die," The Kansas City Star, 23 October 1993, p. A-8.

14. Michael Elliott, "The Making of a Fiasco," Newsweek, 18 October 1993, p. 34.

15. Lydia Saad, "Operation Restore Hope Gets Public's Blessing," The Gallup Poll Monthly, December 1992, p. 18.

16. From a telephone poll of 500 adult Americans taken for Time/CNN on 7 October 1993, by Yankelovich Partners Inc. Sampling error 4.5%.

17. Thomas A. Keaney and Eliot A. Cohen, Gulf War Air Power Survey Summary Report, Washington, D.C., 1993, chap 10, p. 16. Hereafter referred to as GWAPS.

18. GEN H. Norman Schwarzkopf, with Peter Petre, It Doesn't Take a Hero (New York: Random House, 1992), p. 41.

19. Middle East Watch, Needless Deaths in the Gulf War (Human Rights Watch: New York, 1991), p. 41.

20. U.S. Department of Defense, Conduct of the Persian Gulf War, Final Report to Congress, April 1992, P. O-13.

21. U.S. Department of the Air Force, Air Force Manual 1-1, Basic Aerospace of the United States Air Force, Vol I, p. 6.

22. Denise L. Almond, Desert Score (Carroll Publishing Company: Washington D.C., 1991), pp. 44-45.
23. Dr. Milan Vego, "Federal Army Deployments in Bosnia and Herzegovina," Jane's Intelligence Review, October 1992, p. 447.
24. Michael R. Gordon, "U.S. Sees Air Raids Curbing Guns but not Ending War," New York Times, 7 May 93, p. A-10
25. U.S. Department of Defense, Former Yugoslavia Handbook (U.S. Army Intelligence and Threat Analysis Center: Washington D.C., 1993), p. 6-30.
26. Almond, Desert Storm, p. 55.
27. Ibid.
28. Donald J. Mrozek, Air Power and the Ground War in Vietnam (Maxwell Air Force Base: Air University Press, 1988), p. 141.
29. Former Yugoslavia Handbook, p. 1-2.
30. Conduct of the Persian Gulf War, p. 243.
31. Ibid, p. 247.
32. Keaney, Gulf War Air Power Survey, chap. 10, p. 15-16.
33. Robert Frank Futrell, Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1961-1984 (Maxwell Air Force Base: Air University Press, 1989), p. 269.
34. Ibid.
35. Almond, Desert Score, p. 36.
36. U.S. Air Force Flight Manual T.O. 1-1M-34, Aircrew Weapons Delivery Manual, 15 February 1986, p. 1-32.4.
37. Almond, Desert Score, p. 450.
38. Jonathan C. Notzel, When It's Over "Over There" (Maxwell Air Force Base: Air University Press, 1992), p. 4.

39. U.S. Air Force Colonel John A. Warden III, who developed the Desert Storm Air campaign, presented this figure during a 1992 briefing to U.S. Air Force students enrolled in the U.S. Army Command and General Staff Course at Ft. Leavenworth , Kansas.

40. Needless Deaths in the Gulf War (New York: Human Rights Watch, 1991), p. 251.

41. Conduct of the Persian Gulf War, p. 0-11.

42. Almond, Desert Storm, p. 347.

43. FM 100-5 Operations, p. 1-3.

44. Milan Vego, "Federal Army Deployments in Bosnia and Herzegovina," Jane's Intelligence Review, October 1992, p. 448.

45. The following biographical sketch from Dr. Vego's book, Soviet Naval Tactics, establishes him as an expert on the Bosnian civil war.

Milan Vego is a professor at the U.S. Navel War College, Newport, Rhode Island. He has previously worked for the Defense Intelligence College, Defense Intelligence Agency; the Wargaming and Simulation Center, National Defence University; the Foreign Military Studies Office (formerly Soviet Army Studies Office) U.S. Combined Arms Center; and the Center for Naval Analyses.

He served for more than ten years as an officer in the Yugoslav Navy, resigning at the rank of Lieutenant Commander in 1973. During his naval service, he commanded torpedo craft and gun boats and was naval advisor to the Royal Cambodian Navy. From 1973 to 1976 he served as a 2nd mate (deck) on board West German merchant vessels on the Atlantic and Pacific routes.

Dr. Vego holds a Ph.D. in European History from George Washington University. He was born in Yugoslavia and obtained political asylum in the United States in 1976.

46. The previously cited letter from Air Force MG Tenoso to the author presented this description of the Bosnian Serb forces.

47. Military symmetry deals with how well a force "mirrors" its opponent. In the American Civil War for example, both sides possessed large conscript armies. They were therefore essentially reflections of each other and thus highly symmetrical. In contrast, one finds 19th century armies of France and Britain being highly unsymmetrical. Britain's strength lay in its navy while Napoleon's power was the French Army. In Vietnam, U.S. Forces were

conventional units based on firepower and mobility. The North Vietnamese and Viet Cong represented light infantry forces using guerilla tactics. These two forces were therefore unsymmetrical.

48. Douglas Pike, PAVN: People's Army of Vietnam (Novato: Presidio Press, 1986), p. 213.

49. Ibid. p. 215.

50. In August of 1963, the U.S. Army's 66th Military Intelligence Brigade, headquartered in Augsburg, Germany, published an excellent reference booklet entitled "Tactics, Techniques and Procedures of Combatants in Former Yugoslavia." This study uses information from that booklet to describe the terrain features of Bosnia-Herzegovina.

51. Ibid. p. III-4.

52. Clausewitz, On War, p. 596.

53. Gordon, "U.S. Sees Air Raids Curbing Guns but not Ending War," p. 10.

54. Andrew Bilski, "Peace in the Balance," MacLeans, 10 May 1993, p. 19.

55. Lawrence L. Izzo, "The Center of Gravity is not an Achilles Heel," Military Review, January 1988, p. 77.

56. The idea of the equipment chain comes from U.S. Air Force Col. John A. Warden's book, The Air Campaign, which he wrote while a student at the National War College in 1988. Col Warden discusses the equipment chain in chapter three, "Offensive Operations." He describes attacking the chain as an indirect method for achieving air superiority. For example, if one can not directly shoot down an airplane, he can still render the plane inoperable by attacking the airfield where it lands or the refinery which provides it fuel. The same concept of "attacking the chain" seems applicable as a means to eliminate the BSA heavy weapons.

57. Elaine Sciolino, "U.S. Military Split on Using Air Power Against the Serbs," New York Times, 29 April 1993, p. A-1.

58. Gordon, "U.S. Sees Air Raids...", p. A-10.

59. GWAPS, chap. 3 p. 42.

60. Rick Atkinson, Crusade (New York: Houghton Mifflin Company, 1993), p. 263-265.
61. "Tactics, Techniques and Procedures of Combatants in Former Yugoslavia," p. A-2.
62. Earl H. Tilford, Setup, What the Air Force Did in Vietnam and Why (Maxwell Air Force Base: Air University Press, 1991) p. 172-177.
63. Futrell, Ideas, Concepts, Doctrine, p. 310.
64. GWAPS, chap. 6, p. 7.
65. Ibid. chap. 3, p. 49.
66. Ibid. chap. 6, p. 18.
67. Ibid. chap. 6, p. 9.
68. U.S. Air Force Environmental Technical Applications Center (AWS), Scott Air Force Base, Illinois, "Yugoslavian Operational Climatic Data Summary," June 1992.
69. Ibid.
- 70 "Tactics, Techniques, and Procedures of Combatants in Former Yugoslavia," p. A-6.
71. Ibid. p. A-3.
72. This information provided to the author by Dr. Earl H. Tilford. Formerly a visiting professor of military history at the U.S. Air Force Air Command and Staff College, in August Dr. Tilford became the Director of Strategic Studies at the U.S. Army War College. Dr. Tilford discovered this information about air induced landslides while researching his book, Setup, What the Air Force Did in Vietnam and Why, referred to earlier.
73. GWAPS, chap. 3 p. 34-35.
74. "Tactics, Techniques, and Procedures of Combatants in Former Yugoslavia," p. A-3.
75. Vego, "Federal Army Deployments in Bosnia and Herzegovina," p. 446.

76. C. J. Dick, "The Prospects for Conflict Termination in Former Yugoslavia," 7 May 1993, p. 12. Reprinted in U.S. Army School of Advanced Military Studies Text Division and Corps Tactical Operations Exercise, p. 18-29, October 1993.
77. Vego, "Federal Army in Bosnia and Herzegovina," p. 446.
78. Conduct of the Persian Gulf War, p. 223.
79. Lewis MacKenzie, "A Briefing on Reality for Armchair Generals," Los Angeles Times, 5 February 1993, p. B-3.
80. Canadian Gen. Lewis Mackenzie was the commander of the U.N. Protection force in Yugoslavia from May to November, 1992.
81. Robin Knight, "Running in Place As Bosnia Dies," U.S. News & World Report, 28 December 1992, p. 22.
82. John Barry, "By Air- Or Land?" Newsweek, 10 May 199, p. 26.
83. John F. Burns, "Bosnian Serbs Begin to Question Price of Victory," The New York Times, 14 November 1993, p. 8.
84. For a discussion on the concept of war weariness, see Geoffrey Blainey's The Causes of War (New York: The Free Press, 1973).
85. On 13 September 1993, Israel and the Palestine Liberation Organization (PLO) signed a peace agreement seeking to end the traditional enmity between the two groups. As its cornerstone tenant, the agreement has Israel withdrawing forces from Jericho and the Gaza Strip in favor of Palestinian self rule. Since the Balkans have been termed "Europe's Palestine," the Israeli/PLO peace plan provides a degree of hope for peace in Bosnia.
86. Clausewitz, On War, p. 94.

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